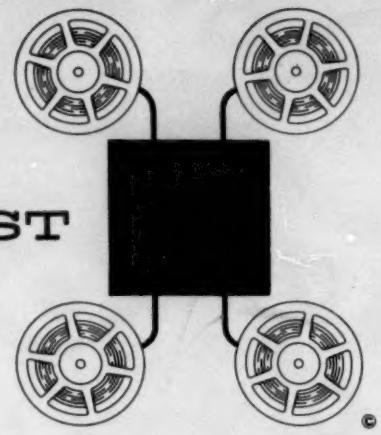
# DATA PROCESSING DIGEST

*1140 South Robertson Blvd., Los Angeles 35, California*

*a publication of Canning, Sisson and Associates, Inc.*




VOLUME 6 NUMBER 9

SEPTEMBER, 1960




# General Information

## ONLY PROFITS JUSTIFY THE INVESTMENT

*T. S. Bayley, Urwick Diebold Ltd.*
*AUTOMATIC DATA PROCESSING, June 1960; pages 20-24*

Suggestions are given for "making a cost calculation that can form the basis of a sound decision on the introduction of automatic data processing."

One should begin with "the actual costs of performing current data processing activities with present methods.... adjusted to reflect the savings that could be made by improvements within the framework of existing methods....[and] the increase or decrease due to the estimated growth or decline of activity." This latter adjustment figure is hard to arrive at, "for it involves not only a prediction of future business activity, but also the determination of the effect of such growth on data processing costs. In practical terms the most realistic results will be obtained by interpreting future changes in volume and items handled in terms of changes in documents, both as regards the number of their content. The probable increase or decrease in clerical wage rates must also be taken into account."

The reason for estimating the future position is that one of the effects of an EDP system is to convert many variable costs into fixed costs. For instance, the cost of the system fluctuates very little as a result of loading, in comparison with a manual system. "An automatic data processing system normally becomes operational about two years after the decision to proceed has been made and must function economically for about five years thereafter, hence a decision must be made at least as much, if not more, on the basis of future conditions than on the present."

Total costs of the proposed system should include the continued cost of performing manually those operations which will not be included in the automatic system; the extra load that may be put on some sections of the organization in order to make effective use of the automatic system; all costs relating to the system such as power, punched cards, tape, program maintenance personnel; and a systems team charged with continuous improvement of the system.

CONTENTS

*Prepare breakeven chart*

Preparation of a breakeven chart may reveal that the breakeven point has already been reached. On the other hand, the value of the planned installation might lie in benefits which cannot be charted, such as the value of a production planning system that does not presently exist. "There may be times when the system can pay for itself completely without taking into account these additional benefits, and it may therefore seem unnecessary to spend time and money in arriving at an estimate of their worth. On the contrary, their evaluation serves two purposes. Firstly, it demonstrates the best case that can be made for installing ADP and, secondly, it causes the study team to look more searchingly for advantages which an ADP system can give. In other cases, failure to take these additional benefits into account can mean that a company which could justifiably employ an automatic data processing system decided against it because top management had not been presented with the full facts. The less telling advantages of speed, accuracy, automatic selection of significant or exceptional information, and the unforeseen benefits that users of automatic data processing systems have experienced, are sacrificed because the study team has omitted, intentionally or otherwise, to put a value on the information that was not available under the old system.

*What is the indirect value of the computer?*

"In every case, a valuation of the indirect results of having an automatic data processing system should be made. There are three ways of doing this and more often than not all three must be employed."

These three ways are as follows:

1. The value that can be expected from the results may be measured, as in the case of inventory control.

2. The cost of achieving the same results with the present system may be calculated.

3. Ranges of worth may be established by the department in the company that is most directly affected. This is the least precise of the three methods.

"Once the anticipated annual savings as well as the total investment required to achieve the savings have been determined, it is possible to divide savings into investment to arrive at the number of years required to recover the investment.... Where annual savings change, either because of an increase in volume of activity over the years or because of the adding of applications over time.... a table should be prepared showing year by year the savings or losses which will be deducted from or added to the investment value...[starting] before the installation of the computer when costs of systems design, training, and so forth are first incurred.... On this basis it is possible to assess the number of years required to recoup the investment or the amount of profit that will have been made in a given number of years.

## WHEN THE COMPUTER TAKES OVER THE OFFICE

*Ida Russakoff Hoos*
*HARVARD BUSINESS REVIEW, July-August 1960; pages 102-112*

The author made a two-year study in 1957-59 of 19 organizations in the San Francisco Bay Area that had EDP systems. They included large and small businesses, such as banks, insurance companies, public utilities, manufacturers, distributors, and processors, and a few government agencies. All major categories of office workers were surveyed. The object was to find answers to some of these questions:

How many more office jobs are eliminated by electronic computers than are added?

In what respects do office workers find EDP jobs less interesting and remunerative?

How has EDP changed management?

What are the changes in personnel relations caused by EDP?

*Five jobs disappear for each EDP job*

It was found that for every five office jobs eliminated by an EDP system, only one was created, and those which do not disappear change drastically. No set standards have been established for selection of EDP personnel, and neither their numbers nor their salary position is high. The category of workers which has grown is that of keypunch operator. However, salaries of these workers are poor, and the work is boring and regarded as a dead-end with no promotional opportunities. A number of upper level office positions are disappearing.

The trend toward re-centralization is also eliminating job opportunities. There are two types of re-centralization distinguishable: 1) integration of specific functions, affecting the internal organization of the company; 2) regrouping of entire units of the operation, causing changes in the external structure. Both types lead to shrinking of job opportunities and downgrading. Because of the structural changes, the EDP department is tending to increase in importance, and EDP executives display a "strong tendency toward empire building." Middle management's function is the monitoring of information before it reaches the EDP system, and handling of exceptions. Because of the limitations of this work, "the value of middle management for training purposes therefore seems to be declining."

*Fear bottles up communications*

Information flow has been greatly affected because of fear. "All the office employees I have talked with, no matter what their position, realize that a revolution is taking place. Most of them do not know how their own jobs will be affected but fear the worst, and they react by resisting any innovations or modifications in their work." Many tab department employees, realizing that their department will

disappear when EDP comes in, use obstructionist tactics. Similarly, the EDP programing team may resist the introduction of a new programing language. "...Some optimistic EDP managers visualize the diagram of communications in the future as a sort of radial configuration, with arrows cutting through all departments and indicating a free flow of all company information into and out of the EDP center. It is an idea worth working for. The inexorable facts at present, however, support the observation that EDP unites functions but disunites people."

*EDP is empire-builder*

EDP people do not appear to conform to the "organization man" pattern. They "resemble the entrepreneurs of a half century ago, in that their goal is to put economics back in business. For them, the basic ingredient of success is efficiency and not popularity." They tend to ignore the possibility of criticism and proceed to design their own projects, initiate changes, hire personnel and supervise their training. "Ignoring all the ground rules of established organizational behavior, [the EDP department] bypasses channels and cuts across departmental lines--all for the purpose of enhanced efficiency....EDP executives pre-empt industrial relations functions which might conceivably facilitate adjustment on the part of the employees, yet ignore the turmoil brought into these people's lives." EDP managers appear to believe sincerely that "office automation causes no job losses and yet cuts clerical costs; that it has no perceptible impact and yet upgrades the labor force; that workers are inspired by the challenge it offers...."

Those inside the computer room "regard information flow as the lifeblood of the enterprise [and] predict they will program themselves right onto the board of directors....Unbelievers, on the other side, tend to view the group as little more than glorified technicians, and anticipate that when the charismatic halo fades, EDP will become just another block on the organization chart."

Since "it is a safe assumption that office automation will continue its phenomenal growth...." detailed study of automation in specific areas can help "toward a workable solution of the problems engendered by automation," and progress can be made toward "full realization of its benefits."

## COMPUTER OCCUPATIONS

*Published by Michigan Employment Security Commission*

A description and guide to computer occupations is the substance of this small pamphlet published by the Michigan Employment Security Commission. Occupations included are: systems analyst, programer, console operator, auxiliary machine operator, tape librarian. Working conditions, location of jobs, earnings, employment outlook, and requirements for entry are included, along with a short bibliography. To order a copy, send 25¢ to The Director, Michigan Employment Security Commission, 7310 Woodward, Detroit 2, Michigan.

## SUPPLEMENT TO CUTTING THE COST OF YOUR EDP INSTALLATION

*Canning, Sisson and Associates, Inc. 1960. $10.00*

This 26-page report supplements the Special Report, "Cutting the Cost of Your EDP Installation," issued by the publishers two years ago. The Supplement is concerned with two aspects of the physical installation of EDP systems: fire prevention lessons learned from the Pentagon fire in 1959, and installation requirements of the new transistor machines. Other aspects of the installation process are fully covered in the original report.

*Fire precautions in the Pentagon*

The material on the Pentagon fire includes information not previously published, and contains a vivid word-picture of the actual fire, as given by one of those in charge of the Air Force Computing Center. Six precautions taken by the Air Force are listed:

1. Notify local firefighting organization of the toxic nature of fumes resulting from burning magnetic tapes and containers.

2. Enclose the computing area with fire wall construction.

3. Install a sprinkler system in the tape vault.

4. Install emergency hammer-type switches that can turn off all the power in the area, and turn on an emergency lighting system.

5. Document the programing and procedures and keep them up-dated.

6. Establish a priority for re-creating data and programs.

In addition, tapes in the computer room itself should be kept in fireproof cabinets when not on the tape units. Nearby auxiliary equipment rooms should be safe-guarded against smoke and water damage.

Findings on installation requirements for transistor machines are summarized from seven case studies included in the report. These findings are: reliability of transistorized EDP machines appears very good; floor areas of the EDP room have been reduced somewhat; air conditioning requirements have been reduced; and there appears to be no increase in dust filtering requirements with the higher density recording on tapes.

Transistor computer installations included in the study include two NCR 304's, four RCA 501's and a Philco 2000. Information about the installation includes the equipment complement, floor areas, ceiling height, air conditioning, dust filtering, and cost of construction of the site. Charts include air conditioning requirements for the machines described, comparative installation characteristics, and thermal properties of mylar tape and polystyrene cases.

## AIR CONDITIONING ELECTRONIC COMPUTER ROOMS

*Margaret Milligan, Canning, Sisson and Associates, Inc.*
*MECHANICAL CONTRACTOR, July 1960; pages 25-29*

Computers and their auxiliary equipment have specific installation and housing requirements not usually found in ordinary office buildings. The special requirements related to air conditioning are reviewed in this article. Some of the considerations in designing the air conditioning system are: technical requirements of the computing equipment, physical appearance of the computer area, and the future expansion plans of the computing facility. Specifically, these considerations are: equipment, personnel, lighting, losses through walls, etc., effect of air leakage, intake of outside air, traffic in and out of computer room, history of temperature and humidity in the area.

The system must be designed to prevent drafts. Inasmuch as the air changes should average one per minute, drafts could be present. Directing the air flow downward helps avoid drafts and also helps to achieve the proper mixing of hot and cold air. It may also help to keep down dust. The presence of dust is critical, as it can settle on magnetic tape and cause errors in processing. Mechanical filters have proved to be satisfactory in most cases.

*Dust and low humidity affect tapes*

Humidity also affects the tapes. The average humidity of about 50% (depending on other conditions) should be maintained to keep magnetic tapes from cracking. A simple metering system for temperature and humidity should be provided, along with a seven-day recording device for historical purposes.

Standby units, or extra capacity should be included in the requirement figures for air conditioning units. This will insure a continuation of conditions, even when there is an air conditioning equipment breakdown. Extra capacity may be used for personnel comfort. For safety purposes, the air conditioning system for the computer area should be independent of all other duct systems in the building, so that the entire system can be shut down in the event of fire. A central control panel should be provided to shut off all electrical power to the EDP system and the air conditioning in an emergency.

The article concludes with a description of the air conditioning provided in the specially designed building which houses the Western Data Processing Center at the University of California at Los Angeles.

## DEFENSE ELECTRONIC DATA PROCESSING ISSUE

*ARMED FORCES MANAGEMENT, July 1960, entire issue*

The theme for the issue on EDP is set in the editorial: "We are paying precious little attention to developing the sort of executive in Defense who comprehends all the nuances of this [EDP] revolution.... EDP makes possible the amassing of greater and greater amounts of information, makes possible the surveillance of more and more operations in detail by higher and higher levels of management. And this is only one of the risks: that the boss will start running everything himself--with all its attendant degradation of the efficiency, effectiveness, the skill and morale of the men in the outer office." These views are enlarged upon in the article titled "How We Mismanage the Mechanical Moron," on page 22.

In the article "Why Frustration at Fort Meade?" some answers are given to those who have criticized the automatic data processing research project through lack of understanding of the purpose and the extent of the program. Fort Meade was selected as a proving ground for the use of electronic computing systems in administrative data processing. It has been engaged in setting up an integrated system on a service center concept to process property, personnel and fiscal accounting. The project is now well on its way and is likely to become the guide for other armed service facilities which may plan for ADPS.

Other excellent articles include: "Source Data Writing: The Computer Bottleneck" "Computer Technology: Where is it Headed?" "How ADP Cuts Depot Costs," and others.

## DATA PROCESSING IN NAVY MANAGEMENT INFORMATION SYSTEMS

*Published by Department of the Navy*

A 64-page directive has been issued by the Office of the Secretary of the Navy which spells out in detail the present and future plans of the Navy for automatic data processing systems, including the general plan, development of the systems, installation management, communications systems, and terminology standards (still being studied). The directive provides the standards for setting up and administering the integrated systems which are expected to cover all data processing needs of the U.S. Navy. A copy may be obtained from the Navy Management Office, Department of the Navy, Washington 25, D.C.

## PROBLEMS IN INSTALLING DATA PROCESSING EQUIPMENT IN BUSINESS

*H. W. Gearing*
*THE COMPUTER BULLETIN, June 1960; pages 3-6*

Twelve problems of installing data processing equipment in business are discussed. These are economic justification, management appreciation, data feasibility, training of programers, informing the organization, equipment selection, site preparation, forms and procedures, program development and testing, transfer of files, conversion, and operator training and documentation of routines.

A comparison is drawn between American and British attitudes toward equipment. "...American industry supplies its employees with a higher level of capital equipment per person employed than we do. I think we use it more....American management [receives] its statistical reports very rapidly at month-end ((requiring peak capacity to process the data and prepare the reports simultaneously)). In contrast, we often find in Britain smaller installations, planned to deal with statistical work after routine accountancy, payroll, etc. [requiring] smaller installations than in the States, but a higher intensity of usage throughout the month."

*Smaller systems, intensified use in Britain*

On the training of programers: "Any company that is thinking of the possibility of installing a computer within the next 10 years, should set about training some of its clerical staff for programming work now, despite the fact that the need for programmers for the 1960's generation of computers will be less than for those of the 1950's. I believe that professional organizations... should include elementary programming in their syllabuses. Sixth forms in school should also do some programming."

On forms design: "Draft forms prepared locally on office duplicating equipment can be experimented with during the trial programming stage. The data required to trigger the computer should use sizes, descriptions and other digital information as used in the factory. Such quaint units as the basis box (area of tinplate) with a radix of 112 sheets to the box, can be handled as easily by a binary machine, as can any other radix."

On programing: "Careful filing of working papers at each stage of program development and the willingness to devote time to cross-referencing one's working papers will make it easier for those facts to be recognized among teams of programmers. Ingenuity in programming is only effective in so far as one can communicate it to other members of the team: if one keeps the working papers in a form that someone else might understand, we ourselves may hope to understand them again when we have to go back to the job and make alterations in a few years' time!"

*Reference all working papers!*

On selection and training of personnel: "I think that all users of office equipment should adopt a policy of recruiting junior staff for training."

## IDEAS FOR MANAGEMENT

*Systems and Procedures Association. $16.00*

The Proceedings of the 12th International Systems Meeting are contained in the just-published Ideas for Management. As in former years, the layout, readability, and information contained in the book are excellent. Our primary interest is in the section concerned with electronic data processing. This edition's EDP section has 25 papers on a great variety of subjects.

Outstanding is Dr. Grace Murray Hopper's historical description of automatic programing, in which she traces the reasons for the development of Flow-Matic, Aimaco, and the newer common languages now being considered by the committees under the Department of Defense.

Among the excellent papers in this section are applications studies, methods of using operations research techniques, a look at developments which will change equipment in the future, and advanced EDP systems planning techniques. Altogether a worthwhile purchase.

## "INPUT" IMPROVEMENTS MAJOR '60 ADVANCE

*OFFICE MANAGEMENT AND AMERICAN BUSINESS, July 1960; pages 15-22*

Optical scanning and photomemory systems suggest ways of improving the input bottleneck. If companies use the same type face on typewriters, inter-company document processing could be greatly facilitated through the use of scanning devices. Photomemory devices offer high-speed access to miniaturized images of original source documents such as letters, plans, drawings, for human viewing.

## MACHINE PERFORMS THREE "R's" IN DATA PROCESSING

*J. E. Towle, Columbia Gas System Service Corp.*
*AMERICAN GAS ASSOCIATION MONTHLY, July-August 1960; pages 23, 24*

"Reading" is the "R" which computing systems perform the most poorly. Optical scanning is suggested as the most efficient method of reading for the public utilities. The first such installation is at The Arizona Public Service Company of Phoenix, Arizona. The scanning device is used to read bill stubs returned by customers. Other potential areas where the ability to read is needed are: meter reading, check reconciliation, order processing, administrative data handling in data transmission networks, and the automatic generation of computer programs.

# Management Sciences

## OPERATIONS RESEARCH AND SYSTEMS ENGINEERING

*Edited by Charles D. Flagle, William H. Huggins, Robert H. Roy*
*Published by The Johns Hopkins Press. $14.50*

Unfortunately, neither the dust jacket nor the foreword of this book indicates for whom it is written. Since the book appears to be directed at a specific audience, it should be defined. In summary, this book represents a refresher for people who have an engineering or scientific background and a little acquaintanceship with OR, but who are not practitioners. Except for a few philosophic discussions in the front, the book is not for the novice since it plunges directly into fairly complex notation, terminology and concepts. At the other extreme, the book is not for the practitioner, as the reviews are brief and describe concepts rather than specific techniques. It might be useful for a practitioner who wants a quick review of an aspect of systems engineering with which he is not immediately familiar - for example, human engineering.

*Case histories*

The early chapters are devoted to philosophic and historical aspects of systems engineering and operations research. The middle part of the book is devoted to specific methods and techniques used in these fields. Four case histories conclude the book.

The foreword summarizes the authors' attitude concisely: "The application of mathematical analysis in operations research is often less direct than in conventional engineering. The models and formulae lend insight into system behavior and the functional relationship between behavior and the factors that affect it; but rather rarely do they yield precise numerical predictions like those that tell the design engineer the deflection of a beam or the pressure of an air foil." Attempts are made at the definition of both operations research and systems engineering in the early part of the book. More important than definitions is the recognition throughout the book that these are related disciplines. There also appears to be a good appreciation of what systems engineering is: the art of designing entities which are larger than those dealt with in other engineering disciplines but which are ultimately subject to the usual engineering approach, although with new methods being useful.

A valuable feature of the book is its coverage. The usual OR techniques are covered (linear programing, queuing theory, theory of games) as are the usual conventional and philosophical examinations (e.g., a chapter on "The Development and Future of Operations Research and Systems Engineering"). But background areas also are reviewed (although not as well as might be desired): basic statistics, statistical quality control, and symbolic logic. In particular, areas useful for

systems engineering are described, including electronic digital computers, simulation techniques, human engineering, information theory, and a relatively new tool "flow-graph representations of systems," and "a discussion of system techniques." Because the book is written by a number of authors, there are inconsistencies and variations in quality. The discussion of simulation in the chapter on "A Survey of Systems Engineering Tools and Techniques" is quite narrow, dealing only with the simulation of the operational part of an equipment system. However, the chapter on Simulation Techniques is good and discusses the situation from a broad point of view.

*OR and background areas are well-covered*

The introduction to information theory concisely describes the concepts, but, in an apparent effort to simplify, presents an example which is difficult to follow. The review of statistical techniques (chapter 9) also tries to put too much in too short a space and at several points (e.g., a discussion of the Poisson distribution, page 236, and of estimating regression parameters, page 250) is misleading. The authors fail to emphasize the decision theoretic philosophy of modern statistics -- a necessary step, if the science is to be used in a dynamic and purposeful manner.

Apparently, the authors, in some areas, have tried to put the concepts into mathematical notation and yet keep it simple. The result is mathematical developments which cannot be followed by those new to the field and cannot be used by practitioners.

In some sense this book might be considered as a super-annotated bibliography and as such might be worth procuring from the library whenever you wish to grasp quickly the concepts behind one or more of the techniques of operations research or systems engineering and wish a short bibliography (which follows each chapter) to further reference.

(Prepared with the assistance of Dr. R. E. Beckwith, Aeronutronic, Division of Ford Motor Company)

# Applications

### COMPUTERS KEEP RAMBLERS ROLLING

*MANAGEMENT AND BUSINESS AUTOMATION, July 1960; pages 18-21, 38*

American Motors Corporation uses IBM 650 data processing systems to handle a production control system based on a single punched card. This card is keypunched from information on typed purchase orders sent to the plant from the zone sales offices. Among the provisions on the purchase order are customer options selected from a possible 100, ranging from color and trim to foam cushions. The schedule card also includes a complete description of the car, and dealer's code number.

From the cards is printed a listing of "Cars Scheduled for Building," which includes serial number; zone number; dealer number; domestic, export, or Canadian order; method of shipment; fleet, zone, taxi or police order; model number; and a complete list of options. Thirty copies are distributed to assembly points. A copy of the original schedule card is converted to punched tape for transmission by teleprinter to work stations at the body plant. The schedule card is also used to prepare shipping papers and Federal labels, as well as billing and miscellaneous records. Twice a week the year-to-date cards are used to print out a recap of all orders received, grouped by series. Year-to-date information, vendor releases, forecasts, and many other reports are derived from the original scheduling cards.

## A PRACTICAL APPLICATION OF ELECTRONICS

*RETAIL CONTROL, June 1960; pages 19-32*

A panel discussion on automation of the accounts receivable function in retailing was presented by Walter M. Greenwood of Stix, Baer & Fuller and Thomas J. Ryan, Peat, Marwick, Mitchell & Co. in November 1959 at St. Louis. The entire dialog is presented in this article.

The accounts receivable function includes sales audit, accounts receivable, billing, mailing, and credit control. The panelists visualized a system which used a medium size computer with punched card input and output and magnetic tape. Customer accounts would be numbered, and sales checks are visualized as being punched cards. As the saleschecks are accumulated in the sales audit department, the information on them is keypunched directly into them. For floor audit systems, department totals, class sales, and salespersons' sales can be punched from the register tapes into blank cards. The cash report can be keypunched from the salesperson's number or register number. If and when scanning devices are used, they can read the necessary information and punch it into the cards. Manufacturers are working on other aspects of this input problem.

It was suggested that the credit control function would be assisted by having a code carried on the billing record which would describe the customer's current credit status. This is necessary because the customer's ledger card does not have sufficient room for an adequate credit history. The code, printed on the bill, would signal the mail clerk as to the type of credit letter she should enclose, if one is needed.

## AUTOMATION SLASHES PAPERWORK, RAISES MANUFACTURING EFFICIENCY

*OFFICE MANAGEMENT AND AMERICAN BUSINESS, July 1960; pages 24-30*

American Bosch Division of Springfield, Mass., has established the Management Operating System which is based on the activating of the entire manufacturing cycle by a single punched card. The MOS operation consists of three basic steps:

1. Input of punched cards containing production schedules; service requirements which reflect replacement part business; and engineering changes.

2. Processing, during which time the Ramac computes the time relationships needed to obtain or produce each component of the finished product. This consists of: Conversion of production schedule orders to requirements by manufacturing dates; measurement of requirements against stock on hand, stock on order, and re-order points; determination of necessity of preparing shop orders and purchase requisitions, by M-Days; Re-evaluation of economic order quantities of production based on changing base factors; periodic re-evaluation of re-order points based on accumulated statistics; cancellation or re-scheduling of unreleased shop orders.

3. Output in the form of: shop orders for economic order quantities, by M-Day; stock planning status reports for released shop orders on all parts; periodic evaluation of optimum inventory levels; suggested changes or cancellations on open purchase orders; immediate answers to inquiries on the status of any part.

The company plans to extend its system to cover tool control over more than 12,000 perishable tools, most of which are purchased from outside vendors.

## COMPUTERS IN MEDICAL DATA PROCESSING

*Robert S. Ledley, George Washington University; and*
*Lee B. Justed, University of Rochester*
*OPERATIONS RESEARCH, May-June 1960; pages 299-310*

It is suggested that present equipment and knowledge of data retrieval make possible the organization of a nation-wide network of computers to maintain health records of the populace, as well as evaluative resources for diagnosis and research. Local computers would communicate with hospitals and physicians in the area for local information processing. The local computers would then be connected with each other to make possible a cross-country transfer of information to cover peregrinating Americans.

### INSTALLING A MEDIUM-SIZED COMPUTER

*THE JOURNAL OF ACCOUNTANCY, July 1960; pages 48-53*

The Stanley Tool division of the Stanley Works, New Britain, Connecticut, makes use of an IBM Ramac in its production scheduling and inventory control functions. "Fast customer service is an important factor in maintaining a favorable sales position in the competitive field of tool manufacturing. Providing it is complicated by the large variety of items in the product line. Also, hand tools must be manufactured in sufficiently large lots to minimize the amount of manufacturing time lost in change-overs from one kind of tool to another." The company needed more timely data on net stock available. "For some items, the inventory on hand may be partly or entirely committed to orders not yet billed or shipped."

The system was found to increase data processing costs rather than reduce them. However, the increase was eventually absorbed by the growing volume of work processed, and as other work is put on the computer, the improved control over operating costs made possible by more timely information, probably will be the most significant benefit.

## Equipment

### ATLAS—A NEW CONCEPT IN LARGE COMPUTER DESIGN

*COMMUNICATIONS OF ACM, June 1960; pages 367, 368*

The Atlas is a large-scale computer being designed by Ferranti Ltd. and the University of Manchester in England. Computing storage will be ferrite core with two cores per bit. Each section of 4096 will operate independently with a cycle time of two microseconds. Consecutive addresses appear in different sections, thus a mean access rate of one megacycle is achieved. "In the fixed store, information is represented by the presence or absence of ferrite slugs in a woven wire mesh, and the cycle time is approximately 1/5 microsecond. This high speed enables many simple subroutines to be executed in times not much greater than those for some of the basic instructions, and the design is such that these subroutines are in every sense an extension of the basic instruction code. One bit in the function of every instruction indicates whether the instruction is basic or 'Extracode' (i.e., to be interpreted by a fixed store routine). In the latter case the rest of the function part determines the entry point to the fixed store routine and the address part is available for use as a parameter.... The fixed store also contains routines for initiating and controlling peripheral transfers, for monitoring programs, for carrying out simple routine engineering tests, and for operating time-sharing between programs."

Address digits are interpreted in a unique manner. "The store is regarded as being composed of blocks of 512 words. Thus, 9 of the address bits determine the position of a word within its block, leaving 11 bits to identify the block. However, these 11 bits do not define directly the physical position of the block. Instead, each block is identified by an 11-bit floating label which is independent of its actual position.

"With each 'page' or block position in the core store there is associated a 'page address register' to hold the label of the block which happens to occupy that page at any moment. Before every store access ... all of these registers are consulted simultaneously and very rapidly. The register whose contents agree with the required block number responds to this enquiry, and its page is then used in the transfer. The consultation of the page address registers is done by special circuitry and does not limit the rate of transfers to and from the store.

"Effectively this is a hardware version of the symbolic address idea, applied to complete blocks.... Its real purpose is to provide a simple basis for the complete automation of the allocation of store space to several programs simultaneously and of the integration of backing storage (e.g., of magnetic drums) into the system."

## CAPTURING COMMERCIAL DATA AT SOURCE

*DATA PROCESSING (BRIT.), July-September 1960; pages 170-175*

The Du-Op (from "dual operation") is a relatively inexpensive data recorder and data converter developed by Industrial Accountancy Partnership Limited. It is being used by co-operative stores in Great Britain to record sales information at point of sale. The recorder is mechanically operated. Sales clerks set a number of levers in selector slots on the rounded face of the recorder, then insert their individual coded key or the department's key to activate the device. A turn of the crank records the numbers set by the levers on punched paper tape. The selectors may be custom designed to provide the specific information desired by the customer. Slots can have up to 12 positions.

The data converters accept the special paper tape punched by the recorder and convert it to the particular type of computer input desired by the customer. The data converters are built to suit the needs of the systems with which they will work. For example, those being used with the British co-operative stores convert to I. C. T. punched cards. Work is progressing on incorporating the Du-Op recorder with a cash register, and with a punched card sensor.

## SOME EQUIPMENT CHARACTERISTICS CHARTS

Several lists of electronic computers and auxiliary equipment are currently available in the literature. These generally give the name and manufacturer of various models, speed, memory capacity and type, rental and purchase prices, input and output facilities, automatic coding systems available, and other usable information. Such information may be found in the following:

Comparison of Major Computer Systems, ARMED FORCES MANAGEMENT, July 1960; pages 34, 35

Know Your Data Processing Machines, OFFICE ADMINISTRATION, May 1960; pages 59-72

What You Should Know About IDP Equipment Other Than Computers, OFFICE ADMINISTRATION, June 1960; pages 24-31

Computer Census: The Second Generation Comes of Age, OFFICE AUTOMATION NEWS BULLETIN, April 30, 1960

Computer Census Results, AUTOMATIC DATA PROCESSING SERVICE NEWSLETTER, July 25, 1960

New Electronic Data Processing Systems, INDUSTRIAL DESIGN, June 1960; pages 104-106

# Training

A Development Program in O. R., sponsored by Case Institute of Technology

Date: September 20, 1960 to January 27, 1961
Place: Case Institute of Technology, Cleveland, Ohio
Information: Dr. E. Leonard Arnoff, Asst. Dir., Operations Research Group, Dept. of Mgmt., Case Institute of Technology, University Circle, Cleveland 6, Ohio

Information Storage and Retrieval, two-week course sponsored by University Extension, UCLA

Date: September 26--October 7, 1960
Place: University of California, Los Angeles, California
Prerequisite: Bachelor's degree with evidence of interest in field. Two units of professional credit
Fee: $175.00
Information: H. L. Tallman, Physical Sciences Extension, Room 6501 Engineering Building II, University of California, Los Angeles 24, California

Seminar on Information Systems and Records Management, presented by the Management Institute of New York University

Date: September 27 through December 2, 1960, each Tuesday evening, 6:15-8:00 PM
Place: New York City, American Arbitration Association, 477 Madison Avenue
Information: Dr. Denis Sinclair Philipps, Director of the Management Institute, New York University, Washington Square 3, N. Y.

Engineering and Management Course, presented by University of California at Los Angeles

Date: January 23--February 2, 1961
Place: UCLA Campus
Fee: $450
Information: Reno R. Cole, Coordinator, The Engineering and Management Course, College of Engineering, University of California, Los Angeles 24, California

# Meetings

SHARE XV Meeting

Date: September 12-16, 1960
Place: Pittsburgh, Pa. (Pittsburgh Hilton Hotel)
Information: E. B. Weinberger, Gulf Research & Development Co., Drawer 2038, Pittsburgh 30, Pa.

Univac Users Association

Date: September 22, 23, 1960
Place: Washington, D. C.

Northwest Computing Conference, sponsored by Northwest Computing Association and the Oregon State Board of Higher Education

Date: September 30--October 1, 1960
Place: Portland, Oregon (Multnomah Hotel)
Information: Floyd Campbell, 1500 S. W. Taylor, Portland 5, Oregon

CUE, Burroughs 220 Users' Group

Date: October 4-6, 1960
Place: Philadelphia, Pennsylvania

Electronic Computer Exhibition and Business Symposium

Date: October 4-12, 1960
Place: London, England (Olympia)
Information: Mr. D. C. Scoones, Peat, Marwick, Mitchell & Co., 94-98 Petty France, London SW 1, England

"How Automatic Data Processing Can be Applied in Your Business," One-Day Conference sponsored by AUTOMATIC DATA PROCESSING

Date: October 5, 1960
Place: London, England
Fee: Five guineas
Information: Automatic Data Processing, Business Publications Ltd., Mercury House, 109-119 Waterloo Road, London SE 1, England

NABAC National Convention

Date: October 10-12, 1960
Place: Los Angeles, California
Information: NABAC, The Association for Bank Audit, Control and Operation, 38 South Dearborn St., Chicago 3, Illinois

International Systems Meeting, sponsored by Systems and Procedures Association

Date: October 10-12, 1960
Place: New York, N. Y. (Hotel Commodore)
Information: Systems and Procedures Association, 4463 Penobscot Bldg., Detroit 26, Michigan

National Meeting, Operations Research Society of America

Date: October 10-12, 1960
Place: Detroit, Michigan (Statler Hilton Hotel)
Information: Albert Wallaert, M.D., Grosse Pointe, Michigan

One-Day Technical Symposium, sponsored by Los Angeles and Orange County Chapters of A. C. M.

Date: October 19, 1960
Place: Anaheim, California (Disneyland Hotel)

The Institute of Management Sciences (TIMS) International Meeting

Date: October 20-22, 1960
Place: New York City (Hotel Roosevelt)
Subjects: Behavioral Science and Management Science, Applications and Tools of Management Science, Use of Computers in Simulation
Information: Mr. James Townsend, 30 East 42nd Street, New York 17

Computer Applications Symposium, sponsored by Armour Research Foundation

Date: October 26, 27, 1960
Place: Chicago, Illinois (Morrison Hotel)
Information: Andrew Ungar, Armour Research Foundation, 10 West 35th Street, Chicago 16, Illinois

Institute on Electronics in Management, sponsored by American University School of Government and Public Administration

Date: October 31--November 4, 1960
Place: The American University, Washington, D. C.
Theme: "Current Developments in Automatic Data Processing Systems"
Information: Dr. Lowell H. Hattery, The American University, 1901 F. Street, N. W., Washington 6, D. C.

Eastern Joint Computer Conference

Date: December 13-15, 1960
Place: New York City (Hotel New Yorker and the Manhattan Center)

DATA PROCESSING DIGEST is published each month by Canning, Sisson and Associates, Inc., 1140 South Robertson Boulevard, Los Angeles 35, California. Subscription rate: $24.00 per year. Foreign postage (exclusive of Canada and Mexico): $2.50 additional. Single copies: $3.00 when available. Executive Editors: Richard G. Canning and Roger L. Sisson. Managing Editor: Margaret Milligan

# References

DATA PROCESSING DIGEST does not provide copies of the original material digested or reviewed in this issue. The publishers addresses are listed below for your convenience in writing to them for more complete information.

The Accountant
4 Drapers' Gardens
Throgmorton Ave.
London EC 2, England

American Documentation
Interscience Publishers
250 Fifth Ave.
New York 1, New York

American Gas Assoc. Monthly
420 Lexington Ave.
New York 17, New York

Armed Forces Management
1001 Vermont Ave., N. W.
Washington 5, D. C.

Automatic Data Processing
Mercury House
109-119 Waterloo Rd.
London SE 1, England

Automatic Data Processing
Service Newsletter
40 Wall Street
New York 5, New York

Automation Progress
Stratford House
9 Eden Street
London NW 1, England

Banking
12 East 36th Street
New York 16, New York

Canning, Sisson and Assoc.
1140 S. Robertson Blvd.
Los Angeles 35, Calif.

Communications of A. C. M.
P. O. Box 1184
Chapel Hill, North Carolina

The Computer Bulletin
The British Computer Society
Finsbury Ct., Finsbury Pave.
London EC 2, England

The Controller
Two Park Avenue
New York 16, New York

Data Processing
Iliffe & Sons Ltd.
Dorset House, Stamford St.
London SE 1, England

Harvard Business Review
Soldiers Field Station
Boston 63, Mass.

Industrial Design
18 East 50th Street
New York 22, New York

Interpreter
I. A. S. A.
P. O. Box 139
Kansas City 41, Missouri

Johns Hopkins Press
Johns Hopkins University
Baltimore, Maryland

Journal of Accountancy
270 Madison Avenue
New York 16, New York

Management & Business
Automation
600 West Jackson Blvd.
Chicago 6, Illinois

Mechanical Contractor
Suite 570, 45 Rockefeller
Plaza
New York 20, New York

Office Administration
146 Bates Road
Montreal 8, Canada

Office Automation News Bulletin
Automation Consultants
155 Fifth Avenue
New York 10, New York

Office Management & American
Business
212 Fifth Avenue
New York 10, New York

Operations Research
Mt. Royal & Guilford Ave.
Baltimore 2, Maryland

Retail Control
National Retail Merchants
Association
100 West 31st Street
New York 1, New York

Systems and Procedures
Association
4463 Penobscot Bldg.
Detroit 26, Michigan

Taxes
Commerce Clearing House, Inc.
4025 W. Peterson Avenue
Chicago 46, Illinois

United States Investor
286 Congress Street
Boston 10, Mass.